



Serial: RNP-RA/12-0062

**MAY 23 2012**

Attn: Document Control Desk  
United States Nuclear Regulatory Commission  
Washington, DC 20555-0001

H. B. ROBINSON STEAM ELECTRIC PLANT, UNIT NO. 2  
DOCKET NO. 50-261/RENEWED LICENSE NO. DPR-23

LICENSEE EVENT REPORT NO. 2012-004-00  
REACTOR TRIPPED DUE TO A TURBINE TRIP CAUSED BY A FEEDWATER  
ISOLATION SIGNAL FROM STEAM GENERATOR 'B' HIGH LEVEL

Ladies and Gentlemen:

Pursuant to 10 CFR 50.73, Carolina Power and Light Company, now doing business as Progress Energy Carolinas, Inc., (PEC) is submitting the attached Licensee Event Report. Should you have any questions regarding this matter, please contact Mr. R. Hightower, Supervisor – Licensing/Regulatory Programs at (843) 857-1329.

This document contains no new Regulatory Commitments.

Sincerely,

A handwritten signature in black ink, appearing to read 'T. Cosgrove', written over a horizontal line.

Thomas S. Cosgrove  
Plant General Manager  
H. B. Robinson Steam Electric Plant, Unit No. 2

TSC/msc

Attachment

c: V. McCree, NRC, Region II  
A. Billoch-Colon, NRC, NRR  
NRC Resident Inspector

*TE22*  
*NR2*

**LICENSEE EVENT REPORT (LER)**(See reverse for required number of  
digits/characters for each block)

Estimated burden per response to comply with this mandatory collection request: 80 hours. Reported lessons learned are incorporated into the licensing process and fed back to industry. Send comments regarding burden estimate to the FOIA/Privacy Service Branch (T-5 F53), U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001, or by internet e-mail to [infocollects.resource@nrc.gov](mailto:infocollects.resource@nrc.gov), and to the Desk Officer, Office of Information and Regulatory Affairs, NEOB-10202, (3150-0104), Office of Management and Budget, Washington, DC 20503. If a means used to impose an information collection does not display a currently valid OMB control number, the NRC may not conduct or sponsor, and a person is not required to respond to, the information collection.

**1. FACILITY NAME**

H. B. Robinson Steam Electric Plant, Unit No. 2

**2. DOCKET NUMBER**

05000261

**3. PAGE**

1 OF 3

**4. TITLE**

Reactor Tripped Due to a Turbine Trip Caused by a Feedwater Isolation Signal from Steam Generator 'B' High Level

5. EVENT DATE			6. LER NUMBER			7. REPORT DATE			8. OTHER FACILITIES INVOLVED	
MONTH	DAY	YEAR	YEAR	SEQUENTIAL NUMBER	REV NO	MONTH	DAY	YEAR	FACILITY NAME	DOCKET NUMBER
03	28	2012	2012	004	00	05	23	2012		05000
									FACILITY NAME	DOCKET NUMBER
										05000

**9. OPERATING MODE**

1

**10. POWER LEVEL**

55%

**11. THIS REPORT IS SUBMITTED PURSUANT TO THE REQUIREMENTS OF 10 CFR §: (Check all that apply)**

- |   |   |  |   |
|---|---|--|---|
| <input type="checkbox"/> 20.2201(b)         | <input type="checkbox"/> 20.2203(a)(3)(i)   | <input type="checkbox"/> 50.73(a)(2)(i)(C)             | <input type="checkbox"/> 50.73(a)(2)(vii)     |
| <input type="checkbox"/> 20.2201(d)         | <input type="checkbox"/> 20.2203(a)(3)(ii)  | <input type="checkbox"/> 50.73(a)(2)(ii)(A)            | <input type="checkbox"/> 50.73(a)(2)(viii)(A) |
| <input type="checkbox"/> 20.2203(a)(1)      | <input type="checkbox"/> 20.2203(a)(4)      | <input type="checkbox"/> 50.73(a)(2)(ii)(B)            | <input type="checkbox"/> 50.73(a)(2)(viii)(B) |
| <input type="checkbox"/> 20.2203(a)(2)(i)   | <input type="checkbox"/> 50.36(c)(1)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(iii)              | <input type="checkbox"/> 50.73(a)(2)(ix)(A)   |
| <input type="checkbox"/> 20.2203(a)(2)(ii)  | <input type="checkbox"/> 50.36(c)(1)(ii)(A) | <input checked="" type="checkbox"/> 50.73(a)(2)(iv)(A) | <input type="checkbox"/> 50.73(a)(2)(x)       |
| <input type="checkbox"/> 20.2203(a)(2)(iii) | <input type="checkbox"/> 50.36(c)(2)        | <input type="checkbox"/> 50.73(a)(2)(v)(A)             | <input type="checkbox"/> 73.71(a)(4)          |
| <input type="checkbox"/> 20.2203(a)(2)(iv)  | <input type="checkbox"/> 50.46(a)(3)(ii)    | <input type="checkbox"/> 50.73(a)(2)(v)(B)             | <input type="checkbox"/> 73.71(a)(5)          |
| <input type="checkbox"/> 20.2203(a)(2)(v)   | <input type="checkbox"/> 50.73(a)(2)(i)(A)  | <input type="checkbox"/> 50.73(a)(2)(v)(C)             | <input type="checkbox"/> OTHER                |
| <input type="checkbox"/> 20.2203(a)(2)(vi)  | <input type="checkbox"/> 50.73(a)(2)(i)(B)  | <input type="checkbox"/> 50.73(a)(2)(v)(D)             | Specify in Abstract below or in NRC Form 366A |

**12. LICENSEE CONTACT FOR THIS LER****FACILITY NAME**

M. S. Connelly

**TELEPHONE NUMBER (Include Area Code)**

843-857-1569

**13. COMPLETE ONE LINE FOR EACH COMPONENT FAILURE DESCRIBED IN THIS REPORT**

CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX	CAUSE	SYSTEM	COMPONENT	MANUFACTURER	REPORTABLE TO EPIX
D	FW	HS	Gemco	Y					

**14. SUPPLEMENTAL REPORT EXPECTED**☐ YES (If yes, complete 15. EXPECTED SUBMISSION DATE) ☒ NO**15. EXPECTED SUBMISSION DATE**

MONTH	DAY	YEAR

**ABSTRACT (Limit to 1400 spaces, i.e., approximately 15 single-spaced typewritten lines)**

At 1503 hours EDT on March 28, 2012, with the unit in Mode 1 at 55% power, the H.B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP, Unit No. 2) reactor tripped due to a turbine trip caused by a Feedwater Isolation signal from Steam Generator (SG) 'B' High Level. The Feedwater Regulating Valve FCV-488 had gone 100% percent open causing a Feed Flow greater than Steam Flow alarm and the SG 'B' level to increase rapidly. The operators placed the valve in manual control and attempted to close the valve; however, the feedwater flow could not be brought under control before the SG 'B' high level set point on 2 of the 3 level protection loops initiated a Feedwater Isolation, turbine trip and corresponding reactor trip.

The site failed to recognize the need for periodic replacement of low wattage control switches based on the guidance in the Control Switch Preventive Maintenance Basis Template, and the apparent lack of site Operating Experience (OE) indicating the need for preventive replacement. This resulted in no preventive maintenance on the failed switch over an extended period. The most likely cause was determined to be high resistance readings on the contacts that caused the feedwater flow signal to reduce to zero.

This event is being reported pursuant to 10 CFR 50.73(a)(2)(iv)(A), any event or condition that resulted in manual or automatic actuation of any system listed in paragraph (a)(2)(iv)(B); the Reactor Protection System and Auxiliary Feedwater system.

**LICENSEE EVENT REPORT (LER)  
CONTINUATION SHEET**

1. FACILITY NAME	2. DOCKET	6. LER NUMBER			3. PAGE
H. B. Robinson Steam Electric Plant, Unit No. 2	05000261	YEAR	SEQUENTIAL NUMBER	REV. NO.	2 OF 3
		2012	- 004	- 00	

**NARRATIVE****I. DESCRIPTION OF EVENT**

At 1503 hours EDT on March 28, 2012, with the unit in Mode 1 at 55% power, the H.B. Robinson Steam Electric Plant, Unit No. 2 (HBRSEP, Unit No. 2) reactor tripped due to a turbine trip caused by a Feedwater Isolation signal from Steam Generator (SG) [SG] 'B' High Level. The Feedwater Regulating Valve FCV-488 [FCV] had gone 100% percent open causing a Feed Flow greater than Steam Flow alarm and the SG 'B' level to increase rapidly. The operators placed the valve in manual control and attempted to close the valve; however, the feedwater flow could not be brought under control before the SG 'B' high level set point on 2 of the 3 level protection loops initiated a Feedwater Isolation, turbine trip and corresponding reactor trip.

The Auxiliary Feedwater (AFW) System automatically actuated due to both main feedwater pump [P] breakers [BKR] opening from a valid feedwater isolation signal. Steam Generator Levels were then controlled by Auxiliary Feedwater pumps. SG Blowdown was automatically isolated with the AFW actuation. The Reactor Coolant System (RCS) Code Safety Valves [RV], Pressurizer Power Operated Relief Valves (PORVs) [RV], SG PORVs [RV] or the Main Steam Safety Valves (MSSVs) [RV] did not open during the event. All control rods fully inserted following the reactor trip.

There were no complications associated with the reactor trip and the reactor was placed in Mode 3 at normal operating temperature and pressure.

**II. CAUSE OF EVENT**

The event was investigated using Condition Report (CR) 527203. It was determined in CR 527203 that the site failed to recognize the need for preventive replacement of low wattage control switches based on the guidance in the Control Switch PM Basis Template, and the apparent lack of site Operating Experience (OE) indicating the need for preventive replacement. Previous anomalies with similar switches, which did not result in failures or plant trips, were not identified as precursors for the failure mode that did result in this trip.

- As documented in Engineering Change 85951, the most likely cause of the Feedwater Regulating Valve FCV-488 going fully open was dirty contacts on selector switch 1/FM-488B [HS] that caused the feed water flow signal to drop to zero. Switch 1/FM-488B has been replaced and satisfactorily tested. In addition, the Feed Flow and Steam Flow Channel Selector Switches on the Reactor Turbine Generator Board, along with the Turbine First State Pressure Channel Selector switch have been manipulated several times to ensure the contacts are clean.
- The Direct Cause of the switch failure, based on laboratory analysis, was fouling of the contacts by wear material from the switch cam. The accumulation of debris inside the switch is a product of switch operation over an extended period of time. The equipment reliability evaluation for this component identified it as a Run to Failure component. With this determination RNP had identified the risk of a failure and accepted this risk having no viable preventive maintenance or replacement time frame.

**III. ANALYSIS OF EVENT**

The technical investigation of the SG 'B' high level turbine trip identified, as the most likely cause, an electrical contact failure in 1/FM-488B selector switch. A high resistance or open of one of the contacts produced a signal for FCV-488 to automatically open. 1/FM-488B is a GEMCO 404 model, configured as a 3 stage, 6 contacts, cam driven-maintaining switch.

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**NARRATIVE**

During the course of the troubleshooting for this event several abnormalities or concerns were identified, investigated and factored into the investigation.

- 1) The laboratory examination of the failed switch observed a high resistance on one of the contacts. The laboratory inspection of the switch reported that the presence of a small amount of debris on one or more of the switch contact surfaces interfered with the proper operation of the switch.
- 2) The laboratory examination also identified a deposit of copper material on the same contact that had high resistance as noted in item 1 above. The contact that had this deposit was not part of the circuit at the time of the event; therefore, this cannot be classified as the point of failure. Although the source of this material could not be determined, it does indicate a vulnerability of the switches to debris collecting on the contact surfaces.

**IV. SAFETY SIGNIFICANCE**

As a result of the 1/FM-488B selector switch contacts losing continuity temporarily while in the closed position, the switch sent a spurious signal to the Feedwater Regulating Valve FCV-488 which resulted in a reactor trip. The event occurred at 55% power which contributed to the event. At this power level the response time to address increasing SG level is greatly reduced.

Failure of this switch does not impact the ability to safely shutdown the plant or maintain it in a safe shutdown condition.

Beyond the risk from an unplanned automatic reactor trip there was no decrease in the margin of safety for the plant or public.

**V. CORRECTIVE ACTIONS**Completed Corrective Actions:

- The failed switch was replaced and the circuitry was tested to verify proper operation.

Planned Corrective Actions:

- Replace the identified low wattage selector switches that provide control signals to plant equipment that are either classified as Critical or Important.
- Initiate and complete a Preventive Maintenance Request that requires periodic replacement of the susceptible channel selector switches.
- CR 422989 evaluated the weaknesses in implementation and effectiveness of the HBRSEP, Unit No. 2, corrective action program. Corrective actions from this CR will ensure that lower level events will be properly captured as OE.

**VI. PREVIOUS SIMILAR EVENTS:**

Licensee Event Reports (LERs) for HBRSEP, Unit No. 2, were reviewed from the past 5 years. No similar events were identified.